If you are using a printed copy of this procedure, and not the on-screen version, then you MUST make sure the dates at the bottom of the printed copy and the on-screen version match. The on-screen version of the Collider-Accelerator Department Procedure is the Official Version. Hard copies of all signed, official, C-A Operating Procedures are available by contacting the ESSHQ Procedures Coordinator, Bldg. 911A

C-A OPERATIONS PROCEDURES MANUAL

15.3.1.9 Resetting an AGS Main Magnet Over-Temperature Interlock

Text Pages 2 through 6

Hand Processed Changes

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Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman Date

M. Bannon, P. Ingrassia

15.3.1.9 Resetting an AGS Main Magnet Over-temperature Interlock

Warning:
Use of this procedure must be approved by the Chief Electrical Engineer and the Maintenance Coordinator prior to each use under AGS minimum LOTO conditions.

1. Purpose

1.1 This procedure instructs Collider Accelerator Support (CAS) and AGS-Booster Power Supply Group members in responding to an AGS Main Magnet Over-Temperature Interlock. Over-temperature Interlocks can arise either from a "Woods-metal" or from a Klixon.

1.2 This procedure is authorized for use under "minimum" LOTO conditions in the AGS.

2. Responsibilities

2.1 CAS and AGS-Booster Power Supply group members are responsible for the execution of this procedure.

2.2 The first line supervisor or the group leader is responsible for documenting and archiving any changes to the procedure for any given use.

2.3 The first line supervisor is responsible to:

2.3.1 Prepare a work plan (green sheet) whenever this procedure is used. The procedure will serve to facilitate the work planning process.
2.3.2 Have the work plan approved by the Chief Electrical Engineer, the First Line Supervisor, the Maintenance Coordinator, and a member of the ESSHQ Division (e.g. Division Head, ES&H Coordinator, Work Planning Coordinator, or the Environmental Protection Coordinator) or an authorized designee of any of the above.
2.3.3 File completed work plans
2.3.4 Include worker feedback on the work plan (green sheet) as well as any changes to the procedure due to unforeseen circumstances

3. Prerequisites

3.1 All personnel working on any electrical system or equipment in the C-AD shall be familiar with BNL SBMS Electrical Safety, BNL SBMS Lockout/Tagout (LO/TO), C-A-OPM 1.5, "Electrical Safety Implementation Plan", C-A-OPM 1.5.3 "Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs", C-A-OPM 2.36, "Lockout/Tagout for Control of Hazardous Energy". C-AD will provide on-site/work specific training to individuals in the electrical safety aspects of their job functions and assignments.

3.2 Personal Protective equipment for a 120V, 15 A Woods-Metal system

3.2.1 NFPA Category 0+:

- long-sleeve shirts and long pants,
- safety glasses,
- all leather palm gloves.

3.3 Personal Protective equipment for a 24V, Klixon system

3.3.1 NFPA Category 0+:

- long-sleeve shirts and long pants,
- safety glasses,
- all leather palm gloves.

3.4 Personal Protective equipment for AGS Sextupole and Quadrupole LOTO

3.4.1 NFPA Category 2 (8 Cal/cm^2):

- Cotton underwear,
- fire-rated long-sleeve shirts and long pants,
- hardhat with arc rated face shield,
- safety glasses,
- all leather gloves,
- leather work shoes,
- hearing protection.

Note:
Cotton underwear not required with 8 Cal/cm^2 Fire Rated long-sleeve shirts and long pants.

4. Precautions

4.1 Care must be taken to LOTO the appropriate energy disconnect switch for the power amplifier to be repaired.

4.2 In case of a problem during execution of this procedure stop work and notify:
4.2.1 the first line supervisor,
4.2.2 the second line supervisor or Group Leader,
4.2.3 the Maintenance Coordinator.

4.3 ANY changes to the procedure, for a given repair, will be documented by completing a green sheet (work plan).

5. Procedures

Warning 1:
Use of this procedure must be approved by the Chief Electrical Engineer and the Maintenance Coordinator prior to each use under AGS minimum LOTO conditions.

Warning 2:
Workers must remain three feet away from elements that are not LOTO.

Caution:
For FY07 Klixons protect AGS Main Magnets in Superperiods A,B,C,D,E and J
For FY07 Woods-Metals protect AGS Main Magnets in Superperiods F,G,H,I,K,L

5.1 If the AGS Main Magnet Power Supply (AMMPS) trips off as a result of a Main Magnet Over-temperature indication then do the following:

5.1.1 At the AMMPS Control Room determine if the over-temperature was the result of a klixon or a woods metal – by looking at the PLC for the klixon system. Woods-metal faults are indicated in the Main Control Room.

5.1.2 Once the location of the interlock is determined apply minimum LOTO to the AGS

5.1.2.1 LOTO the AMMPS, Powered Back-leg windings, and the active filter (asterisked items on the loto checklist C-AD OPM Att. 2.6.1.a)

5.1.2.2 IF the location of the interlock is not determined then apply Controlled Access LOTO (C-AD OPM Att. 2.6.1.a), find the problem, and fix it.

5.1.3 If the over-temperature was the result of a klixon, enter the ring and reset the klixon that was found to be the problem (step 5.1.1).

5.1.3.1 Klixon resets are located on the outside of the ring and are accessible from the aisle.

5.1.4 IF the over-temperature was the result of a woods-metal then

5.1.4.1 Enter the AGS and go to the summary board for the superperiod indicated by the MCR indicator.

5.1.4.2 Determine which pair of magnets has the failed woods metal

5.1.4.3 IF the magnet pair includes or is in between main magnets eleven through twenty, then leave the ring and (CAS) apply Controlled

Access LOTO because the woods-metals are only accessible from the catwalk. Then, locate the problem and fix it (proper PPE required – see paragraph 3.3).

5.1.4.4 IF the magnet pair includes or is in between main magnets one through ten, then some additional LOTO may be required.

5.1.4.4.1 IF the woods metal is in the 1-2, or 4-5, or 6-7, or 9-10, gap then no additional LOTO is required. Find the problem, and fix it (proper PPE required – see paragraph 3.1).

5.1.4.4.2 IF the woods-metal is in the 3-4 gap then LOTO the AGS Vertical Tune Quads, find the problem and fix it (proper PPE required – see paragraph 3.3)

5.1.4.4.3 IF the woods-metal is in the 5-6 gap then LOTO the SEB drive/resonant sextupoles **if the problem is in B, E, H, K superperiods**. Find the problem and fix it (proper PPE required – see paragraph 3.3)

5.1.4.4.4 IF the woods-metal is in the 7-8 gap then LOTO the AGS Vertical Sextupoles, find the problem and fix it (proper PPE required – see paragraph 3.3)

5.1.4.4.5 IF the woods-metal is in the 2-3 or 8-9 gap then [(H&V low field correction dipoles are present (40V / 15A)] instruct an MCR operator to turn off the H&V low field dipole power supplies. Find the problem and fix it (proper PPE required – see paragraph 3.1)

6. Documentation

6.1 Work Plan (Green Sheet) archived by first line supervisor.

7. References

7.1 SBMS Electrical Safety Subject Area – Personal Protective Equipment (PPE).

7.2 AGS Ring Lockout-Tagout Checklist – Controlled Access OPM Att. 2.6.1.a

7.3 C-A-OPM 1.5, "Electrical Safety Implementation Plan".

7.4 C-A-OPM 1.5.3 "Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs".

7.5 C-A-OPM 2.36, "Lockout/Tagout for Control of Hazardous Energy".

7.6 SBMS Electrical Safety.

7.7 SBMS Lockout/Tagout (LOTO).

8. Attachments

None